Space Weather Forecast

Issued on Sunday, 25 December 2022 at 01:30 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Potential Earth-directed CMEs on 26 and 27 December with possible G1/Minor Storms and low risk of G2.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Low, with limited, low energy Common-class flares observed through the last 24 hours. The largest regions, AR3169 and AR3171 remaining large but magnetically bipolar. The remaining regions have shown only modest developments and all remain relatively simple. A CME observed leaving the northeast quadrant early on 24 December, may glance the Earth on 26 December but with low confidence. A further possible CME from the northern crown, and three from the vicinity of AR3169 will be analysed should sufficient imagery become available.

Solar Wind / Geomagnetic Activity: Solar winds have followed a declining trend through the last 24 hours from elevated to slightly elevated levels. Magnetic field strength has fallen from moderate to weak levels, with the north-south component only varying weakly. Geomagnetic activity started with a single G1/Minor Storm interval becoming Unsettled to Active through the remainder of the period.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary
Solar Activity: Solar activity is expected to be mainly at Low levels, with a slight chance of M-class flaring.

Solar Wind / Geomagnetic Activity: A CME which left the Sun on 21 December is likely to have passed the Earth with no effects and has been removed from the forecast. Two further CMEs have forecast to have Earth-directed CME. The first, which left the northeast quadrant of the Sun 24/0230UTC may glance the Earth on 26 December. A further CME which left the Sun 23/2330UTC may arrive at earth on 27 December based on recent Enlil forecasts.
A fast solar wind is expected to continue to wane through 25 December. A further fast wind may then connect either late on 26 or during 27 December, but with low confidence, as the feature generating the wind continues to weaken. Any further connections may however be masked by CME arrivals.

Geomagnetic activity is forecast to be mainly Quiet to Unsettled on 25 December. There is then a risk of Active or G1/Minor Storm intervals on 26 and 27 December due to possible CME arrivals and a chance of these combining with the high speed wind connection. Any CME arrival on 27 December could see residual storming into 28 December.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, although the daily risk has been revised upwards slightly to account for recent growth in the largest sunspot group.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	5	50	20	20
Strong	G3	No	1	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	25	25	25	25
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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